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Occurrence of a New *Stygiotrechus* (Coleoptera, Trechinae) in the Takanawa Peninsula of Northwestern Shikoku, Southwest Japan

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Abstract A new upper hypogean species of the trechine genus *Stygiotrechus* belonging to the *ohtanii* group is described from near the southwestern corner of the Takanawa Peninsula at the northwestern part of the Island of Shikoku, Southwest Japan. It is related to *S. satoui* S. UÉNO, but is decisively discriminated from it by the differently shaped male genitalia and configuration of the prothorax. The new name given is *Stygiotrechus iyonis* S. UÉNO et ASHIDA.

It has long been known that the trechine beetles of the genus *Stygiotrechus* are mainly distributed along the northern side of the Median Tectonic Zone of West Japan, though several species are also found from the southern side at the eastern part of the generic range (cf. ASHIDA & KITAYAMA, 2003; UÉNO & NAITÔ, 2003). In the Island of Shikoku, an endogean species, *S. satoui* S. UÉNO (1976, p. 278, figs. 1–4; 1980, p. 10; 1983, p. 74) has been known from three distant localities in the Sanuki area north of the main course of the Yoshino-gawa River, or from the northern side of the Median Tectonic Zone, and has become differentiated into two geographical races. It has crossed the Yoshino-gawa Valley at least at two points, though the true systematic status of these southward invaders has not been clarified as yet due to insufficiency of available materials.

In the summer of 2001, a specimen of *Stygiotrechus* apparently belonging to the same lineage as *S. satoui* was unexpectedly obtained by Shun-ichi YAMASHITA in a small valley near the southwestern corner of the Takanawa Peninsula at the northwestern part of the Island of Shikoku. Though lying on the northern side of the Median Tectonic Zone, this peninsula is largely granitic and not favourable for harbouring anophthalmic trechine beetles. Only its southernmost part along the northern side of the Shigenobu-gawa and Nakayama-gawa Valleys forms a narrow belt of shale and

sandstone, and sometimes furnishes good habitats to subterranean inhabitants. Two isolated species of the subgenus *Miyamaidius* are restricted to this narrow area (cf. UÉNO, 1978), and YAMASHITA's specimen was also found there.

However, it was not easy to find out additional material of the beetle due to lack of good collecting sites. We examined the narrow area intensively and were able to locate only a few spots that might be promising. At last near the end of the second trip to the small valley, we came across a habitat of the *Stygiotrechus* at the bottom of a fairly large scree sliding down to near the source of the stream. One month later, we made a third trip to the same spot, dug out tons of accumulated gravel, soil and embedded stones above the bedrock, and collected a pair of additional specimens at last.

A careful examination of these fresh specimens amply proved that the *Stygiotrechus* was a distinctive new species, though it was doubtless close to *S. satoui* as was originally surmised by the junior author. It will be described in the present paper under the name of *Stygiotrechus iyonis* in view of its zoogeographical importance. The abbreviations used herein are the same as those explained in previous papers of ours.

Before going into further details, we wish to express our heartfelt thanks to Mr. Shun-ichi YAMASHITA, without whose discovery and generosity in submitting the specimen to our study, this important species could never be introduced to science. Our deep appreciation is also due to the following colleagues and friends of ours, who willingly helped the senior author in the painstaking and time-consuming work of excavation in the swelteringly hot and mosquitoey environment: Drs. Kazuo ISHIKAWA, Yoshiaki NISHIKAWA, Masahiro SAKAI and Shinzaburo SONE, Mr. Yoshiyuki ITÔ, and Ms. Haruko ISHIKAWA.

Stygiotrechus iyonis S. UÉNO et ASHIDA, sp. nov.

(Figs. 1–3)

Length: 2.45–2.65 mm (from apical margin of clypeus to apices of elytra).

Belonging to the *ohtanii* group and closely related to *S. satoui* from Sanuki Province, particularly to subsp. *compira* S. UÉNO (1980, p. 6, figs. 5–6) from Zôzu-san, but the pronotum is a little more strongly contracted at the base and widest more in front, with the sides more briefly and somewhat more strongly arcuate in front and either straight or slightly sinuate behind, and with the base more briefly and deeply emarginate on each side just inside hind angle, which is usually denticulate laterad. Definitely different from *S. satoui* in the configuration of aedeagus, which is only very slightly arcuate and sigmoidally curved, with very short basal part and almost rectangularly curved apical part.

Colour somewhat darker than in *S. satoui*, almost concolorously dark reddish brown, with somewhat lighter palpi, apical halves of antennae, and legs. Microsculpture, pubescence and chaetotaxy as in *S. satoui*. Head similar to that of *S. satoui*, with genae subangulate before neck constriction; HW/HL 1.16–1.28 (M 1.23); antennae reaching basal two-sevenths of elytra or extending slightly beyond that level.

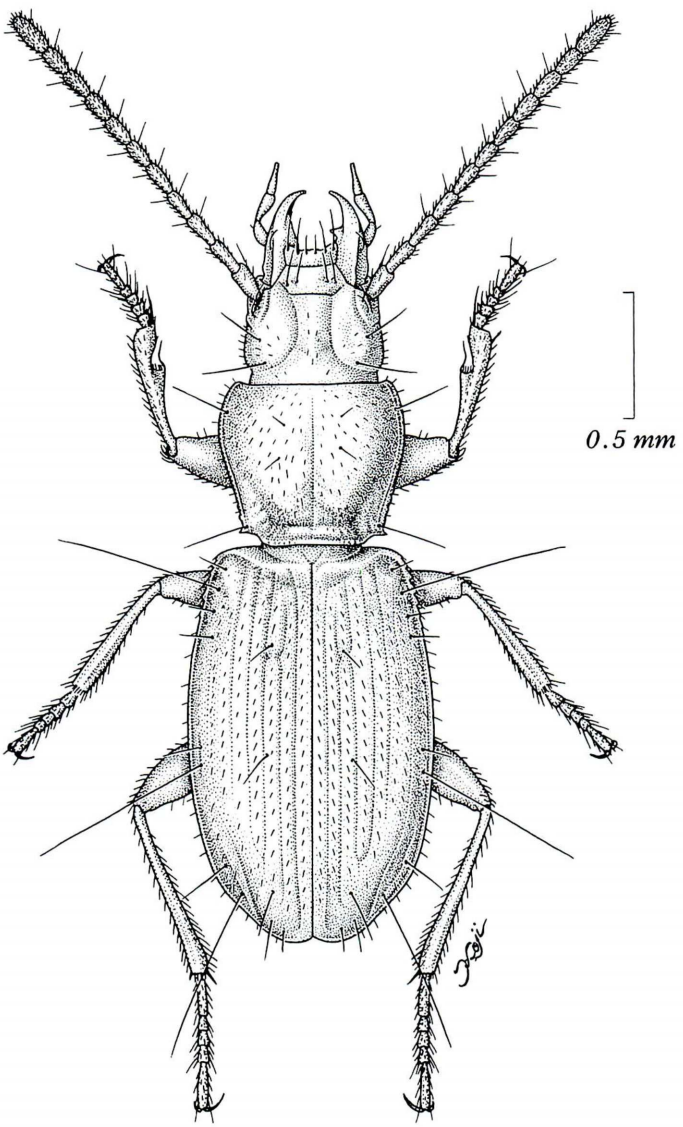
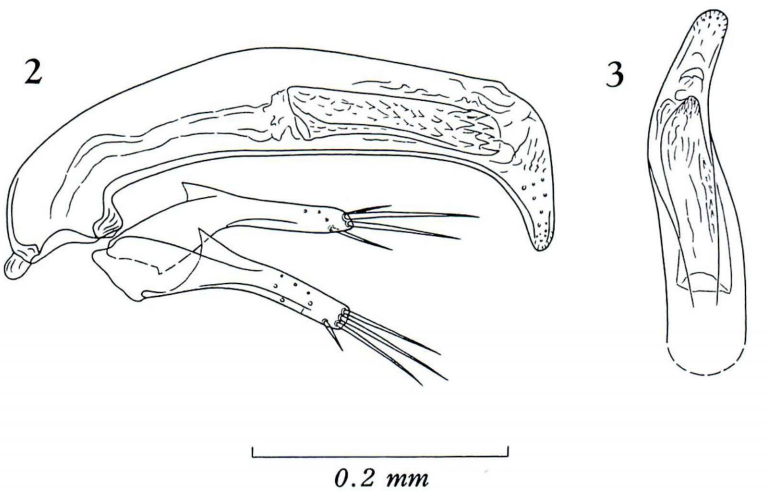


Fig. 1. *Stygiotrechus iyonis* S. UÉNO et ASHIDA, sp. nov., ♂, from the Aonami-dani of Sugitaté.

Pronotum transverse subcordate rather than subquadrate, widest at about five-sevenths from base, and more gradually narrowed posteriad than anteriad; PW/HW 1.27–1.30 (M 1.28), PW/PL 1.06–1.14 (M 1.11), PW/PA 1.24–1.27 (M 1.25), PW/PB 1.27–1.32 (M 1.30); sides gently and rather briefly arcuate in front, less so behind, and either straight or slightly sinuate at about basal fourth, with weak indentation at the



Figs. 2–3. Male genitalia of *Stygiotrechus iyonis* S. UÉNO et ASHIDA, sp. nov., from the Aonami-dani of Sugitaté; left lateral view (2), and apical part of aedeagus, dorso-apical view (3).

basal parts; hind angles usually denticulate laterad; apex always a little wider than base, PA/PB 1.02–1.05 (M 1.04) [PB/PA 0.95–0.98 (M 0.96)], with front angles obtuse and only slightly advanced; base nearly straight at middle, briefly and deeply emarginate on each side just inside hind angle; discal sculptures generally similar to those of *S. satoui*, though the postangular carinae are very obtuse, much less prominent than in *S. satoui*.

Elytra similar to those of *S. satoui*, though more deeply striate, widest at about four-ninths from bases; EW/PW 1.31–1.40 (M 1.35), EL/PL 2.29–2.45 (M 2.38), EL/EW 1.54–1.61 (M 1.58); shoulders square and more or less reflexed, with distinctly serrate humeral borders, each provided with five to seven teeth, two or three of which are larger than the others; sides feebly arcuate at middle, separately rounded at apices, which form a very obtuse re-entrant angle; apical striole deeply impressed, hardly curved in front, and usually joining stria 7; stria 3 with two setiferous dorsal pores at 1/5–2/9 and 4/9–1/2 from base, respectively; preapical pore more distant from apex than from suture.

Ventral surface and legs as in *S. satoui*.

Male genital organ basically similar to that of *S. satoui*, but utterly different from it in the configuration of aedeagus. Aedeagus small and lightly sclerotized, about two-sevenths as long as elytra, elongate, compressed, only very slightly arcuate, and sigmoidally curved in dorsal view, with the apical part almost rectangularly curved ventrad; basal part small and very short, abruptly bent ventrad, with small basal orifice whose sides are moderately emarginate; sagittal aileron very small but protrudent, moderately sclerotized; apical part narrow, inclined to the left, and gradually narrowed towards the narrowly rounded tip of apical lobe in dorsal view, ventrally protrudent

and more rapidly narrowed towards the blunt extremity in lateral view; ventral margin nearly straight behind middle in profile, though deeply emarginate at the base of apical lobe. Inner sac scaly near apical orifice and armed with an elongate copulatory piece, which is about two-fifths as long as aedeagus and coarsely serrate at the apical portion. Styles slender with narrow apical parts; left style longer than the right and devoid of protrudent ventral apophysis; each style provided with four apical setae, one or two of which are much shorter than the others.

Type series. Holotype: ♂, 450 m alt., 20–VII–2003, S. UÉNO leg. Allotype: ♀, 450 m alt., 24–VIII–2003, Y. NISHIKAWA leg. Paratypes: 1♂, 450 m alt., 25–VIII–2003, S. SONE leg.; 1♀ (damaged), 430 m alt., 27–VII–2001, S. YAMASHITA leg. All but YAMASHITA's specimen are deposited in the collection of the Department of Zoology, National Science Museum (Nat. Hist.), Tokyo.

Type locality. Aonami-dani, 430–450 m in altitude, of Sugitaté in Matsuyama-shi, Ehimé Prefecture, northwestern Shikoku, Southwest Japan.

Notes. The type locality of this interesting species, the Aonami-dani, is a small valley carved by one of the upper courses of the Ishité-gawa River. The stream Aonamidani-gawa rises in a gently sloping bamboo grove, flows north across the narrow belt of shale and sandstone, joins the Ishité-gawa and turns west, then southwest just after entering the granitic area, and finally empties into the Inland Sea of Seto-naikai. With the exception of afforested parts, the valley is largely shaded by deciduous and evergreen broadleaved trees and bamboos.

The first specimen, unfortunately badly damaged, was met by YAMASHITA from beneath a stone embedded in the bank of a narrow branch stream, called the Koya-dani, not far upstream from its joining point with the main stream course. This branch stream was carefully examined to near its source, but no good place for excavation was found out mainly due to the high ground water level.

The other three specimens examined were found from a scree on the right side of the main stream about 250 m apart to the northwest from the Koya-dani site. This fan-shaped scree was formed on a steep mudstone bed, nearly 10 m wide at the skirts and about 5 m wide at the top, 5–6 m long, and 50–130 cm deep, and had been largely covered with grasses before excavation. Its subsurface layer, 30–50 cm in thickness, was composed of rather loosely accumulated gravel of mudstone, shale and sandstone with many embedded stones of fairly large size, and readily crumbled down when dug up. On the contrary, the bottom layer was moist and more stable, forming a favourable habitat for subterranean animals.

Several specimens of *Yamautidius* (*Miyamaidius*) *anaulax* S. UÉNO (1978, pp. 200, 203, figs. 4–5) were found near the upper part of the bottom layer, together with diplurans, myriapods, and *Atranodes kyushuensis* (HABU), a primarily subterranean platynine, whereas all the specimens of *Stygiotrechus iyonis* were met with at the deeper parts of the bottom layer, that is, on or near the bedrock. The holotype was found at a depth of about 100 cm, the allotype at about 50 cm, and the paratype at 120 cm; they were always crawling on the undersurface of embedded stones. Thus, the

present species is typically upper hypogean in contrast to its relative, *S. satoui*, which is typically endogean.

The new specific name *iyonis* is derived from Iyo Province, an old name of Ehimé Prefecture.

要　　約

上野俊一・芦田　久：四国の高縄半島におけるノコメメクラチビゴミムシの発見．—— ノコメメクラチビゴミムシ属*Stygiotrechus*のチビゴミムシ類は，これまで四国の北西部からは知られていなかったが，その1種が，高縄半島の基部を東西方向に走る狭い頁岩・砂岩地帯から発見された．四国の北東部に分布するオオタキメクラチビゴミムシ*S. satoui* S. UÉNOに近縁のものだが，地下浅層性であり，雄交尾器にいちじるしい差異があるので，新種イヨメクラチビゴミムシ*Stygiotrechus iyonis* S. UÉNO et ASHIDAとして，この論文に記載した．この新種の存在は，チビゴミムシ類の分布模様を解析するうえできわめて重要な発見であり，今後の調査を進めるに際して大きい手掛かりを与えるものである．なお，上記の頁岩・砂岩帯からは，固有のタカナワメクラチビゴミムシ亜属*Miyamaidius*の2種がすでに知られている．

Postscript

At the last stage of proof-reading of the present paper, the junior author had an opportunity to visit the type locality of *Stygiotrechus iyonis*, and in collaboration with Takumi SAITÔ and Yoshihide OKUDA, made further excavation of the very scree that had yielded three of the four specimens of the type series. They succeeded in obtaining nine additional specimens of the trechine beetle, as recorded below.

Additional specimens examined. 3♂♂, 6♀♀, same locality as for the holotype, 12–X–2003, T. SAITÔ, Y. OKUDA & H. ASHIDA leg.

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